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Guide for the

303 IN

VICKERS MACHINE GUN

ITS MECHANISM & DRILL
WITH
QUESTIONS
& ANSWERS



6^D NET

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GUIDE

FOR THE

.303-in. VICKERS MACHINE GUN

(MAGAZINE RIFLE CHAMBER)

GUIDE
FOR THE
·303-in. VICKERS MACHINE GUN
(MAGAZINE RIFLE CHAMBER)
MOUNTED ON TRIPOD MOUNTING, MARK IV.

ITS MECHANISM AND DRILL
WITH
QUESTIONS AND ANSWERS

FULLY ILLUSTRATED.

LONDON: GALE & POLDEN, LTD.,
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—
1915.

PREFACE.

This little work, having been compiled with considerable care, will, it is hoped, prove a useful pocket companion to many who are called upon to use the Machine Gun. It is written in the popular form of Questions and Answers, thus enabling the student to learn the gun thoroughly with at least half the study. Plates showing the component parts of the gun have been added and will be found of the utmost assistance in learning their names and descriptions, thus simplifying a most important part of the knowledge required, in fact it can well be termed "The Machine Gun Made Easy."

June, 1915.

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Vickers Gun.

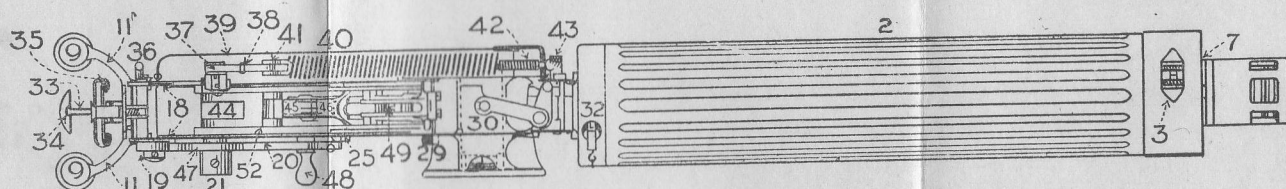
Plate I.

BREECH CASING PARTS.

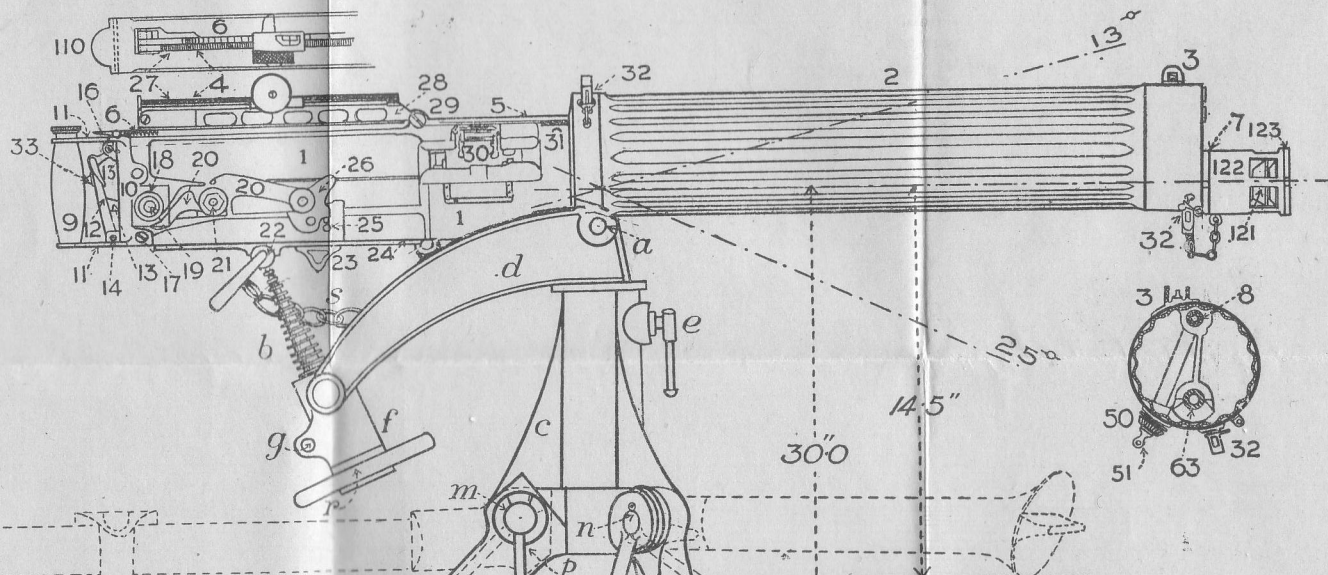
COVER REMOVED.

BARREL CASING.

PLAN.



SECTION.



GROUND LINE LEGS OF TRIPOD EXTENDED

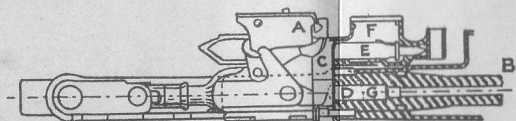
MOUNTING. TRIPOD. '303 INCH
MAXIM GUN, MARK IV.

WEIGHT OF MOUNTING, 48 LBS.

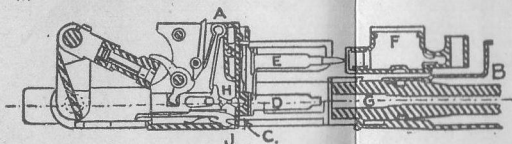
- a. Crosshead.
- b. Elevating gear.
- c. Socket
- d. Arm, crosshead.
- e. Screw, clamp, checking traverse.
- f. Tumbler, elevating gear.
- g. Bolt, jamming, elevating gear.
- h. Front legs.
- k. Rear leg.
- l. Shoes.
- m. Socket lugs.
- n. Stud, joints, and jamming handle, front legs.
- p. Joint pin and jamming handle rear leg.
- r. Handwheel elevating gear.
- s. Chain, securing elevating screw.
- t. Strap to secure legs during transport.

GROUND LINE

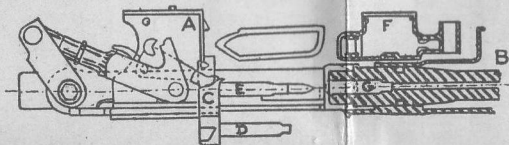
WORKING POSITIONS OF LOCK.



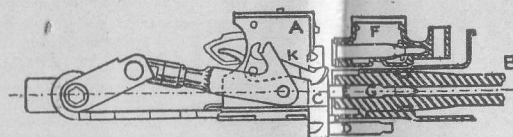
- 1.—Lock A fully home and just fixed. Extractor C engaging with empty case D in chamber G and cartridge E in feed block F.



- 2.—Lock A and barrel B recoiling. Extractor C withdrawing empty case D from chamber G and a cartridge E from the feed block F. Firing pin H cocked and safety gear J engaging.

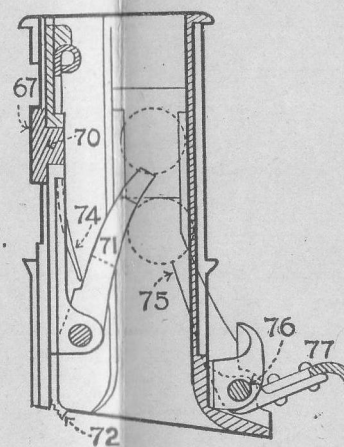


- 3.—Lock A in nearly fully recoiled position. Barrel B returning. Extractor C down, brings cartridge E in line with chamber G, and empty case D either falls off or is pushed off when extractor C rises.

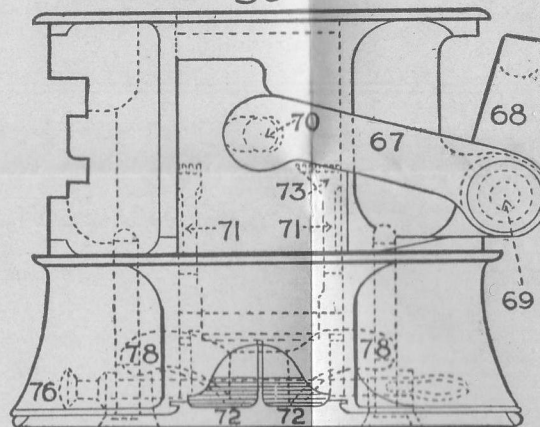


- 4.—Lock A returning, barrel B home, extractor C being raised by levers, K, leaving empty case D to be pushed off, cartridge F in chamber G, and about to engage with another in feed block F.

FEED BLOCK.

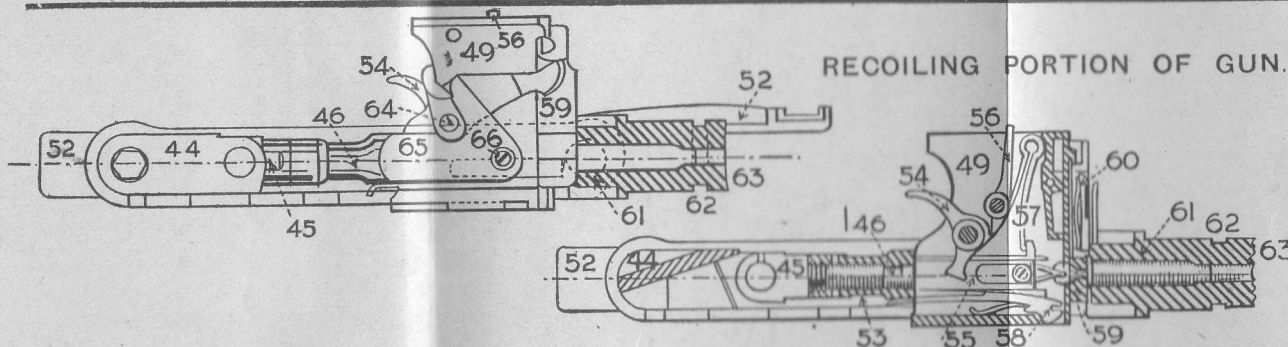


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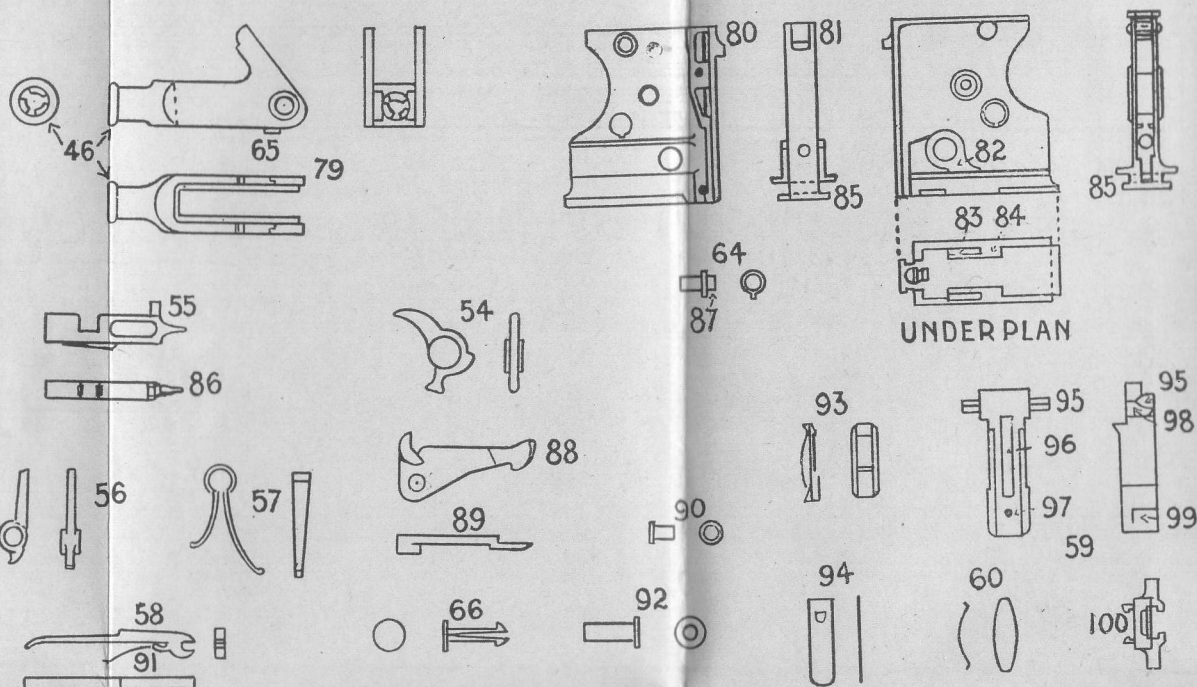
PLAN

RECOILING PORTION OF GUN.



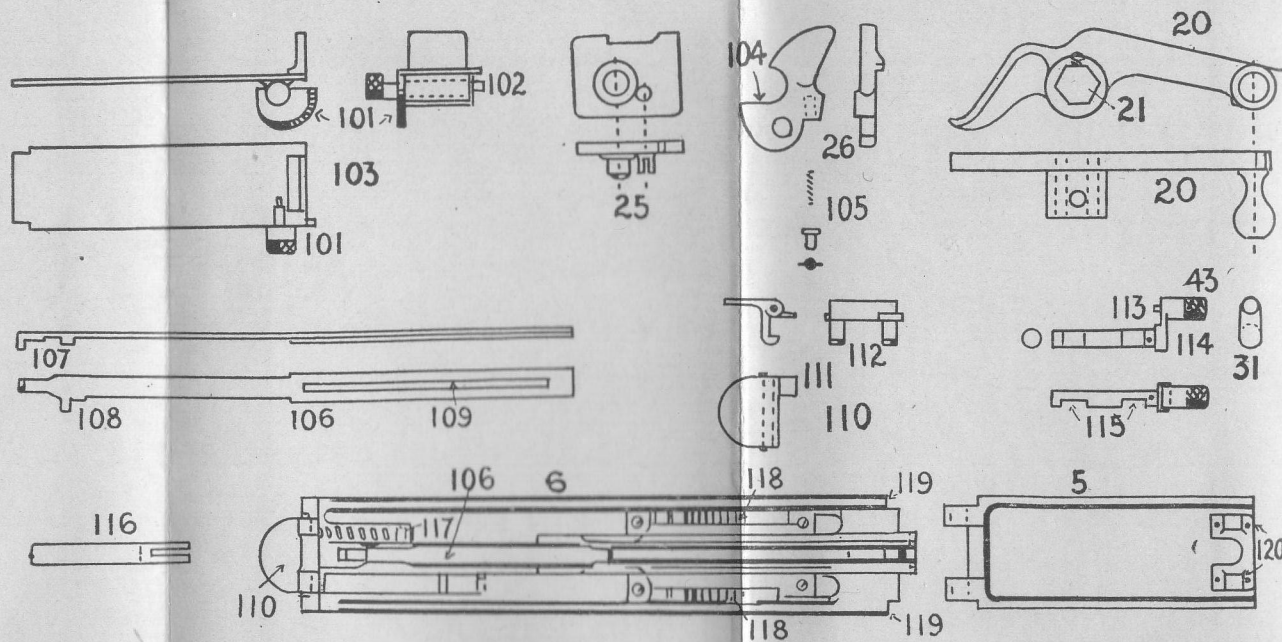
Vickers Gun.

PARTS OF THE LOCK.



UNDER PLAN

VARIOUS PARTS OF GUN.



·303-INCH VICKERS GUN.

Explanation of Plates I., II., III.

Similar numbers indicate corresponding parts in all the plates.

- | | |
|--|--|
| 1 Casing, breech. | 64 Pin, axis, tumbler. |
| 2 Casing, barrel. | 65 Lugs on side levers for 83. |
| 3 Bracket, foresight. | 66 Pin, split, keeper, bush, axis, side levers. |
| 4 Sight, tangent. | 67 Lever, top, feed block. |
| 5 Cover, front. | 68 Lever, bottom, feed block. |
| 6 Cover, rear (Lock rear cover). | 69 Pins, split, fixing, top and bottom levers, feed block. |
| 7 Gland. | 70 Stud of top lever for feed block slide. |
| 8 Tube, steam. | 71 Pawl, top, feed block, rear. |
| 9 Grips, rear-crosspiece. | 72 Thumb grips of 71 and 73. |
| 10 Rear-crosspiece. | 73 Pawl, top, feed block, front. |
| 11 Arms of rear-crosspiece. | 74 Spring, top pawls, feed block. |
| 12 Lever, firing. | 75 Pawls, bottom, feed block (pair). |
| 13 Pawl, firing lever. | 76 Pin, axis, bottom pawl, feed block. |
| 14 Pin, screwed, axis, firing lever. | 77 Finger plate of bottom pawls, feed block. |
| 15 Catch, safety. | 78 Spring, bottom pawls, feed block. |
| 16 Pin, screwed, axis, safety catch. | 79 Levers, side (pair). |
| 17 Pin, screwed, joint, rear-crosspiece. | 80 Upper extractor stop of lock casing. |
| 18 Slides, right and left. | 81 Lock. |
| 19 Roller. | 82 Bearings on lock casing for 79. |
| 20 Handle, crank. | 83 Slots in lock casing for 65. |
| 21 Pin, screwed, fixing, crank handle. | 84 Interruptions in flanges of lock casing. |
| 22 Bracket, elevating joint. | 85 Flanges of lock casing. |
| 23 Stop, mounting. | 86 Pin, firing. |
| 24 Plate, bottom, breech casing. | 87 Key of pin, axis, tumbler. |
| 25 Bracket, check lever. | 88 Bent of extractor lever for 79. |
| 26 Lever, check. | 89 Lever, extractor, right. |
| 27 Base of tangent sight stem | 90 Pin, axis, trigger. |
| 28 Bridge, rear cover. | 91 Sear, spring. |
| 29 Pin, screwed, joint cover. | 92 Bush, axis, side levers. |
| 30 Block, feed. | 93 Gib. |
| 31 Catch, front cover. | 94 Cover, gib spring. |
| 32 Plug, screwed. | 95 Horns of extractor. |
| 33 } Thumbpiece, firing lever. | 96 Recess in extractor for 93. |
| 34 } | 97 Hole in extractor for 86. |
| 35 Finger grips, safety catch. | 98 Shoulders of extractor for 89. |
| 36 Pin-T, fixing, rear-crosspiece. | 99 Grooves in extractor for side plate springs. |
| 37 Fusee. | 100 Grooves in extractor for 81. |
| 38 Chain, fusee. | 101 Thumb piece, sliding shutter catch. |
| 39 Box, fusee spring. | 102 Plunger, sliding shutter catch. |
| 40 Spring, fusee. | 103 Shutter, sliding. |
| 41 Hook, fusee spring. | 104 Pin, keeper, check lever. |
| 42 Screw, adjusting, fusee spring. | 105 } Piston, check lever. |
| 43 Lever of catch, front cover. | 106 } Spring, check lever. |
| 44 Crank. | 106 Bar, trigger. |
| 45 Rod, connecting. | 107 Lug on trigger bar. |
| 46 Socket of side levers for 53. | 108 Lug on trigger bar for 117. |
| 47 Tail of crank handle. | 109 Slot in trigger bar for 56. |
| 48 Knob of crank handle. | 110 Lock, rear cover. |
| 49 Casing, lock. | 111 Lug on rear cover lock for 116. |
| 50 Protector, screwed, condenser boss. | 112 Hooks of rear cover lock. |
| 51 Plug, cork. | 113 Plunger, front cover catch. |
| 52 Plate, side, right. | 114 Hole for keeper pin, front cover catch. |
| 53 Stem of connecting rod. | 115 Grooves in front cover catch to clear 120. |
| 54 Tumbler. | 116 Spring, rear cover lock. |
| 55 Protection on firing pin for 57. | 117 Spring, trigger bar. |
| 56 Trigger. | 118 Ramps, rear cover. |
| 57 Spring, lock. | 119 Grooves in rear cover. |
| 58 Sear. | 120 Hoops of front cover catch. |
| 59 Extractor. | 121 Cup, muzzle attachment. |
| 60 Spring, gib. | 122 Casing, outer, muzzle attachment. |
| 61 Trunnion block, barrel. | 123 Cone, front, muzzle attachment. |
| 62 Cannelure in 63 for asbestos packing. | |
| 63 Barrel. | |

GUIDE

FOR THE

.303" VICKERS MACHINE GUN.

NOMENCLATURE OF PARTS OF GUN.

1. The following is the nomenclature of parts of the gun:—

Lock.—Consisting of casing; side levers, axis bush and split keeper pin; extractor levers right and left; extractor; gib; gib spring and cover; sear and spring; trigger and axis pin; tumbler and axis pin; firing pin; lock spring.

Block, feed.—Consisting of body; slide; top and bottom levers and split fixing pin; top and bottom pawls (front and rear); springs and axis pins.

Rear crosspiece.—Consisting of body; T-fixing pin; joint pin, check nut and V.M.G.

fixing
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cover
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sing;
eeper
king;
-hook
boss
with

sing;
ring;
pin,
right
pin;
nger,

in the

keeper pin; firing lever with pawl and axis pin; trigger bar lever; safety catch, axis pin, spring with piston; milled heads with oil brushes and leather washers.

Box, fusee spring.—

Spring, fusee.—Including fittings.

Screw adjusting fusee spring.—Including vice pin.

Fusee.—With chain and fixing pin.

Plate, side, right.—Including side plate spring.

Plate, side, left.—Including side plate spring.

Crank.—Including crank pin and fixing pin.

Rod, connecting.—Including adjusting nut and six washers; three No. 1 (.003-inch); three No. 2 (.005-inch).

Handle, crank.—Including fixing pin.

Barrel.—With asbestos packing.

Sight, tangent.—Consisting of stem; graduated plate and upper and lower fixing screws; slide; pinion; pawl and fixing

pin; slide spring; milled head and fixing screw; axis pin; tangent sight spring and piston.

Cover, rear.—Consisting of cover; cover lock, axis pin and spring; trigger bar and spring; cover joint pin with check nut and keeper pin. —

Cover, front.—

Casing, barrel.—Consisting of casing; steam tube with slide valve and keeper screw; packing gland*; asbestos packing; two screwed plugs each with link, S-hook and stud; protector for condenser boss with chain and swivel; plug, cork, with chain and two S-hooks.

Sight, fore.—

Casing, breech.—Consisting of casing; check lever, keeper pin, piston and spring; sliding shutter with catch, keeper pin, spring and plunger; slide left; slide right with roller, collar and split fixing pin; front cover catch, keeper pin, plunger, plug, and spring.

* When the muzzle attachment is used this is kept in the spare parts box.

Muzzle attachment for ball-firing.—Consisting of casing, outer, with split keeper pin, chain, S-hook and stud; disc; cone, front; cup, muzzle, with clamping screw; and gland.

N.B.—Casings, breech and barrel, are riveted together and cannot be separated.

QUESTIONS AND ANSWERS

GENERAL DESCRIPTION.

Q. What is the weight of the gun?

A. 28½lbs. (including muzzle attachment, weighing about 1lb.); 38½lbs. with water in casing.

Q. What is the weight of the Tripod Mounting Mark IV.?

A. 48lbs.

Q. What is the normal rate of fire?

A. 500 rounds a minute.

Q. Into how many portions is the gun divided?

A. Two. The non-recoiling, and the recoiling.

Q. What two forces cause the automatic working of the gun?

A. (a) The explosion of the charge.

(b) A strong spring (called the fusee spring).

THE NON-RECOILING PORTION.

Q. Of what does the non-recoiling portion consist?

A. The barrel casing and breech casing.

Q. How is the gun attached to the mounting?

A. By the crosshead and elevating joint pins.

Q. Describe fully the barrel casing.

A. The barrel casing is of steel with longitudinal corrugations, the interior being tinned to prevent rust. It has three openings, one on the upper right side near the breech for filling, one underneath near the muzzle for drawing off the water, and the third (also near the muzzle), for allowing the steam, but not the water, to escape. The first two are closed with screwed plugs; the last is open and connected with the steam tube.

Q. How is the waste of water from jolting prevented when travelling?

A. A cork plug is inserted in the steam escape hole.

Q. Is this plug removed before commencing to fire?

A. Yes; and again inserted before the gun changes position. The cork plug fits into a special fitting made to receive the tube connected with a condenser.

Q. What is this fitting provided with?

A. A protector, to be used when the condenser is not connected to the gun.

Q. What does the front end of the barrel casing contain?

A. A gunmetal guide to lead the barrel through the front of the barrel casing, when the barrel is being replaced after stripping.

Q. What is the object of this guide?

A. It forms a bearing for the barrel, and at the same time a seating for the asbestos packing.

Q. What prevents the water escaping out of the barrel casing?

A. At the forward end of the barrel casing, asbestos packing is placed round the barrel and held in position by the packing

gland. At the rear end of the barrel there is a cannellure, also filled with asbestos packing.

Q. Explain fully the steam tube and slide valve.

A. The steam tube, which is of brass, consists of a fixed tube and an outer tube, termed the slide valve, so arranged as to slide freely along the fixed tube. In the fixed tube there is a hole near each end, and a third hole in the threaded portion in front, which connect with the steam escape hole by a tube attached to the interior of the barrel casing. The steam tube is screwed into the front end of the barrel casing, and is retained in position by a keeper screw, which ensures that the third hole coincides with the steam escape hole. At the breech end it fits into a thimble fixed to the rear end of the barrel casing. If the gun is fired with elevation, the valve slides backwards, and, closing up the hole at the rear end of the tube, prevents the water entering; at the same time it leaves the front hole uncovered, which, being above the water level, allows the steam to enter the tube and escape through

the steam escape hole in the barrel casing. Similarly, if the gun is fired with depression, the valve slides forward and allows the steam, but not the water, to escape through the rear hole. When the gun is horizontal, either one or both holes are uncovered by the valve.

Q. What is the design of the foresight?

A. Blade-shaped.

Q. How is the foresight protected?

A. By side wings formed on the block fixed to the barrel casing, in which the foresight dovetails.

Q. How is the foresight assembled?

A. Through an opening in the right wing, and there is a punch hole in the left wing for adjusting and removing.

Q. What does the breech casing consist of?

A. Two outside plates (right and left) and a bottom plate, and is riveted to the barrel casing.

Q. How is it closed?

A. At the top by the two covers, front and rear, and at the end by the rear crosspiece.

Q. What is the object of the opening in the bottom plate?

A. To enable the empty cartridge cases to fall to the ground.

Q. What is the sliding shutter used for?

A. When shut it prevents dirt, etc., from entering the gun.

Q. What must be done before the gun can be loaded?

A. The shutter must be moved to the rear.

Q. If the shutter is closed after loading, what happens?

A. Only one shot can be fired, but the empty case will remain in the breech casing and another cartridge will be fed up; the extractor dropping on to the shutter will prevent the lock going forward.

Q. What ensures the empty case being knocked off the extractor should it fail to drop off before the extractor is in a position to rise?

A. There is a seating for ejection on the bottom of the barrel casing.

Q. What is on the outside of the right-hand plate?

A. The check lever, which pivots on a stud, and is secured by a keeper pin. The stud has a groove cut in it to allow for the movement of the check lever and pin.

Q. What is inside the check lever?

A. A small spiral spring and piston inside it which bear against a second stud and, by their action, force the check lever over, thus causing the crank handle to be momentarily held down while the breech is closed.

Q. What is the object of the two studs on the outside of the left-hand plate and the elevating stop on the underside?

A. The two studs are for holding the front end of the fusee spring box, and without the elevating stop it is possible for the bracket head of the mounting to damage the fusee spring box.

Q. What is the object of the openings in the rear end of both plates?

A. They are the openings in which the crank bearings move, and are partly closed by slides.

Q. What does the right slide carry?

A. The roller, collar, and spit fixing pin.

Q. What is on the left slide?

A. A stud for holding the rear end of the fusee spring box.

Q. Explain the use of the cams which are inside both plates.

A. They control the path of the extractor. These cams have a step cut in each, on the rear sloping surface. These steps are for the purpose of preventing the lock going forward if, owing to insufficient recoil, the recoiling portions do not come back far enough to allow the extractor to drop. They are also the means of hanging the lock. (See pages 38-9.)

Q. How are the outside plates connected at the rear end?

A. By the rear crosspiece, which is hinged at the bottom by a screwed joint pin.

Q. What is the rear crosspiece fitted with?

A. With handles of wood, inside which are steel cylinders for carrying oil closed by milled heads fitted with brushes; firing lever with thumb piece; trigger bar lever; safety catch; and safety catch piston and spring, which also actuates the trigger bar lever.

Q. How is the upper end of the rear crosspiece fixed in position?

A. By a T-shaped screwed pin, which passes through the outside plates from left to right. The pin acts also as an axis pin for the trigger bar lever and a tool for stripping the lock and other parts of the gun. The trigger bar lever draws back the trigger bar by the action of a pawl on the firing lever which presses forward its lower end.

Q. How are the two covers hinged?

A. Both on one joint pin attached to the outside plates just behind the feed block. The pin is secured by a check nut with a keeper pin. The joint also forms a tie for the outside plates.

Q. How is the front cover secured?

A. By a catch which must be turned up to open it. This catch, when down, is kept in position by a plunger and spring.

Q. What prevents the extractor from rising too high?

A. The extractor stop on the underside of the front cover at its rear end, and the stop on the lock casing.

Q. Where is the tangent sight?

A. On the top of the rear cover, about half-inch from the rear end of the breech casing, is the tangent sight, which is positioned by a piston and spring. The sight, when down, rests on a bridge, which is solid with the rear cover, and strengthens it. The sight is of the "U" pattern.

Q. Explain the tangent sight.

A. The tangent sight consists of stem, a plate graduated up to 2,900 yards (Mark VI ammunition, 2,800 yards), and slide. Running through the centre of the slide is a pinion, the teeth of which work in the rack on the stem. A pawl is secured to the pinion by a fixing pin. On the underside of one

end of the pawl are teeth, which engage in the circular rack on the slide. When the slide is at rest the stud on the inside of the milled head (nearest the slot for the slide spring) bears on the stud on the pawl immediately over the teeth, being actuated by the slide spring, and thus forcing the teeth into the circular rack. This keeps the slide stationary on the stem. On rotating the milled head, this stud is partly disengaged from the stud on the pawl, thus permitting a second stud on the milled head to press on one side of the V-shaped ramp at the other end of the pawl. This action releases the teeth sufficiently to permit of the pawl being moved round the circular rack by the action of the stud bearing on one side of the V-shaped ramp on the pawl; this moves the slide along the stem. On releasing the milled head, the spring positions the cover, thus causing the stud on the pawl to become once more engaged with the stud on the milled head and to force the teeth into the rack.

Q. How is the rear cover lock actuated?

A. By a flat spring on the inside of the cover, and has to be lifted to open.

Q. How is the casing and cover kept rigid?

A. The rear cover and rear crosspiece are grooved to fit over the edges of the breech casing, so that when the rear crosspiece screwed T-fixing pin is home and the cover locked, these, with the assistance of the screwed cover joint pin, keep the casing and cover rigid.

Q. Explain the working of the trigger bar.

A. The trigger bar slides inside the rear cover. It has a lug on the right, against which the trigger bar spring bears, and a projection on its rear end, which engages the bent of the trigger bar lever. In its front end is a slot which allows the top of the trigger to pass when the lock is moving backward and forward. The block which closes the front end of the slot engages with the top of the trigger and draws it back when the trigger bar is drawn backwards by pressure on the firing lever.

Q. What are fixed inside the rear cover?

A. Two ramps, which force the extractor

down on recoil, and guides, which assist in keeping the lock down.

Q. What is the muzzle attachment for ball firing provided for?

A. To assist recoil.

Q. How is it fixed?

A. It is screwed into the packing gland seating at the front end of the barrel casing, the end portion acting as the gland.

Q. Describe the attachment.

A. The outer casing is a hollow cylinder screwed internally at the front end to receive the front cone, and bored and grooved at the rear end to form an inner divided flange for the connection and retention of the gland, which has an outer flange correspondingly divided for engagement. Vent holes for the escape of gases are cut near the front end of the casing. A split pin is attached to the outer casing by means of a chain connection. The pin can be entered in either of three holes bored equi-distantly in the outer casing for engagement with either of three corresponding holes in the gland when the casing

is home in position on the gland. The disc is placed in the front end of the outer casing and is pressed home and held in position by the front cone. The muzzle cup is bored at the rear end to fit on to the end of the barrel. This end of the cup is split and is arranged to receive a transverse clamping screw for fixing the cup rigidly to the barrel. The gland and front cone have flanges which are grooved to receive the combination tool provided for assembling and stripping purposes.

RECOILING PORTION.

Q. What does the recoiling portion (which is mounted inside the non-recoiling portion) consist of?

A. A barrel and two side plates, which carry the crank and lock.

Q. Describe the barrel.

A. The barrel is browned and has a groove round it near the muzzle for the clamping screw of the muzzle attachment, a flat being cut in front of the groove to allow the attachment to be assembled. At the breech end it is formed with a square block, from which

project two studs (one at each side) called the barrel trunnions. By means of these trunnions the barrel is connected to the side plates. The front of the barrel block bears against the face of the barrel bearing in the barrel casing.

Q. How are the barrel trunnions received into the side plates?

A. The side plates are both bored to receive the barrel trunnions, and have guides, along which the flanges of the lock move. These guides have two interruptions on each side to enable the lock to be lifted out. In addition, each side plate has a bearing through which the crank passes, thus connecting the latter with the barrel; these bearings move in slots in the breech casing.

Q. What is the object of the side plate springs, which are fitted to both side plates?

A. To ensure that the horns of the extractor do not drop below the solid cams during the backward movement of the lock when there are no cartridges on the extractor.

Q. Explain fully the crank.

A. The crank is fitted with a connecting rod, which is free to rotate on the crank pin, and, outside the breech casing on the right, with a curved handle, the upper surface of which bears on the roller when the gun is firing. On the left it is fitted with a fusee to which is attached a chain of two links, by means of which it is connected to the fusee spring.

Q. Explain the use of the connecting rod.

A. The connecting rod is attached to the crank by means of an axis pin called the crank pin, and is arranged to take the lock by means of an interrupted flange, thereby connecting the crank and lock. It has an adjusting nut and washers are provided which enable its length to be increased. By this means the space between the extractor and the barrel for the base of the cartridge is kept within safe limit, thus preventing separations.

Q. Describe the fusee spring; and state how it is attached to the gun.

A. On the left of the breech casing there is a strong spiral spring called the fusee

spring, the rear end of which is connected by the fusee chain and fusee with the crank; the front-end is attached to the breech casing by means of the fusee spring box and adjusting screw, which passes through the front end of the fusee spring box, and through the nut at the front end of the spring.

Q. How is the fusee spring adjusted?

A. The fusee spring can be adjusted without removing the box, as the vice pin of the screw is loose. This screw is kept in position by two nibs which enter recesses in the front end of the fusee spring box and are retained by the tension of the fusee spring.

Q. How is the fusee attached to the crank?

A. The fusee is attached to the crank by means of a stem and lugs and is easily removed.

Q. How is the lock attached to the connecting rod?

A. By the side lever head, and when in the firing position closes the breech.

Q. By what means is the breech prevented from being opened at the moment of firing?

A. It is held in position by the side levers, the crank (fixed in bearings in the side plates), and the connecting rod, which are all slightly below the horizontal.

Q. How is the reciprocating motion communicated to the lock?

A. By the rotation of the crank.

Q. How is the lock kept in position during its backward and forward movements?

A. By means of flanges working along guides on the side plates, and by the guides on the underside of the rear cover.

Q. Describe the lock casing.

A. The lock casing has a piece riveted inside at the top of the front face, which acts as a guide for the lock spring when assembling, and also forms a seating for the spring. Its sides are drilled for the various axis pins, and on its underside it has flanges which work on the guides on the side plates. The lower of these flanges has interrupted

portions to agree with those in the guides and allow the lock to be removed from the gun.

Q. How is the extractor attached to the front end of the lock?

A. By guide ribs, upon which it slides, and contains the gib. The projections on the gib, together with the cartridge grooves, form recesses which retain the cartridge in position.

Q. How are the movements of the extractor regulated?

A. The extractor is moved upwards by means of the side and extractor levers. The upward and downward movements of the extractor are regulated by guide ribs and stops; the top stop on the face of the lock casing acting in conjunction with the stop on the underside of the front cover limits the upward travel of the extractor, while the bottom stops, formed on the sides of the lock casing, limit its downward travel by intercepting the extractor levers.

Q. Describe the feed block.

A. The feed block is of steel and fits under the front cover into a recess cut in the breech

casing. It is provided with a slide to which are attached two pawls with spring for the purpose of moving the cartridges from right to left. These pawls are made with finger pieces and can be pressed down together, releasing the pawls from the belt. The slide has a transverse motion given to it by means of two levers which are fitted together; the top lever has a stud which engages a slot on the slide, and on the bottom lever is a stud which engages in the recess in the left side plate; by this means the slide is connected with the recoiling portion. The feed block has also two stationary lower pawls which are connected by a finger piece, and which engage under the succeeding cartridge and prevent the belt slipping backwards during firing. The feed block is provided with guides fitted above and below in the cartridge way, which ensure the cartridges coming to the exact position where they can be gripped by the extractor; they are prevented from being pushed too far through to the left by means of the cartridge and bullet stops, which are inside the feed block.

Q. How is the gun supplied with cartridges?

A. By means of a belt which passes from right to left through the feed block. This belt is formed by two pieces of webbing connected together by eyelets and brass strips of two lengths, the projecting strips showing how far the cartridge should be inserted; the belt is made thick at the edge next the bullets by being folded over a piece of cord, so that the cartridges may be kept parallel in passing through the feed block, and lie evenly in the ammunition belt boxes.

ACTION OF MECHANISM.

It is not alone sufficient for a high standard of knowledge of mechanism to be reached; it must also be maintained, and therefore instruction should be continuous throughout the year, for it is easily forgotten if neglected.

A theoretical knowledge of the mechanism is not sufficient. Instruction must be so thorough and practical as to ensure that all mechanical operations are performed correctly from force of habit, so that they will be car-

ried out instinctively in moments of excitement.

Note.—(i) A belt and dummy cartridges will invariably be used for purposes of instruction. (ii) A service lock must always be in the gun, when firing either ball or blank ammunition. For instructional purposes, when ammunition is not being fired the D.P. (instructional) lock should be used in the gun whenever possible.

The following is the correct sequence in which instruction in mechanism should be given; each stage must be thoroughly understood before proceeding to the next.

LOADING.

Q. How is the gun loaded?

A. (a) Pass the tag end of the belt through the feed block from the right side; (b) with the right hand pull the crank handle on to the roller; (c) with the left hand pull the belt through to the left front as far as it will go; (d) let go the crank handle. The first cartridge will then be gripped by the extractor. Repeat the above, and, when this has

been done, the first cartridge will be in the chamber, and another gripped by the upper part of the extractor. The gun is then ready for firing.

Q. On raising the safety catch and pressing the thumb piece of the firing lever, what is the effect?

A. The gun will fire automatically until pressure is released. The lock will then be home, and the extractor will be gripping (a) a live cartridge in the feed block and (b) a live cartridge in the chamber.

EFFECT OF THE FORCE OF THE EXPLOSION OF THE CHARGE AND OF THE FUSEE SPRING.

Q. Suppose the gun to have just fired the first cartridge in the belt; the extractor will be gripping the second live cartridge in the feed block and the empty case, which has just been fired, in the chamber; how is the mechanism affected?

A. The explosion will cause the recoiling portion to move backwards through a distance of about one inch, thereby extending the fusee spring.

Q. To what is the backward movement due?

A. Partly to recoil and partly to the effect of the ball-firing attachment which acts as follows—The powder gases which escape from the muzzle after the exit of the bullet strike violently against the front cone and rebound on to the front face of the muzzle cup, driving it and the barrel, to which it is attached, backwards. The gases then escape into the air through the openings in the outer casing.

Q. How is the feed block affected?

A. The recess in the prolongation of the left side plate by means of the stud actuates the bottom lever of the feed block. The bottom lever acts on the top lever, which moves the slide and the top pawls to the right, to engage behind the cartridge held in place by the bottom pawls.

Q. What is the effect of the rotation of the crank?

A. The backward movement of recoil causes the tail of the crank handle to roll against the roller, thereby rotating the crank.

The rotation of the crank draws back the lock and causes the fusee to wind the fusee chain, thus further extending the fusee spring. The continued rolling of the crank handle against the roller assisted by the fusee spring forces the whole of the recoiling portions forward again, with the exception of the lock, which continues its backward movement for a short distance before it joins in the forward movement. As the recoiling portions go forward, the recess in the prolongation of the left side plate actuates the bottom lever of the feed block. This bottom lever acts on the top lever, which moves the slide and the top pawls to the left, the pawls thus bringing the third cartridge in the belt to a position against the cartridge and bullet stops, ready to be gripped by the extractor. The belt, as it moves to the left, slides over the bottom pawls, which are depressed as the cartridge passes over them, and rise behind the fourth cartridge, holding the belt in position and preventing it from sliding back after the second cartridge has been withdrawn by the extractor.

Q. What takes place when the lock moves backwards?

A. The extractor withdraws the empty case from the chamber and a live cartridge from the belt in the feed block. The horns of the extractor move along the upper surface of the solid cams until the cartridge is clear of the belt. When the extractor arrives at the rear end of the cams it is forced down by the ramps in the cover, thus bringing the cartridge drawn from the feed block in line with the chamber, and causing the empty case drawn from the chamber to fall off the extractor.

Q. What prevents the live cartridge from slipping down the face of the extractor?

A. The bottom projection of the gib. (If the empty case does not fall off when the extractor drops, it will be forced off by the seating for ejection on the bottom of the barrel casing when the extractor rises.)

Q. Describe the cocking action.

A. The rotation of the crank gives an upward motion to the connecting rod and

side lever head, which latter, bearing on the tail of the tumbler, rotates it on its axis, and thus forces the firing pin to the rear. The long arm of the lock spring acts on the projection of the firing pin, while the short arm bears against the nose of the trigger; consequently the withdrawal of the firing pin compresses the lock spring by drawing the long arm towards the short arm. As the tumbler rotates, the nose of the trigger is forced by the short arm of the lock spring under the bent of the tumbler, and the continued motion of the tumbler forces the firing pin still further back, until the bent of the sear (which is actuated by the sear spring) is forced into the bent of the firing pin and retains it. The firing pin is thus prevented from flying forward.

Q. Describe the action of the fusee spring.

A. When the force of the explosion is expended, the action of the fusee spring comes into play, continuing the forward movement of the barrel and side plates, and unwinding the fusee chain from the fusee. This gives the crank a rotary motion, which forces the connecting rod and side lever head down-

wards, causing the lock to continue the forward movement (*see* pages 28-29), and place the live round in the chamber. The extractor is moved upwards by the side levers acting on the extractor levers. The bottom projection of the gib slides over the base of the live cartridge in the chamber and the top projection of the gib slides over the base of the cartridge which has been automatically moved up into position in the feed block. The firing pin hole is thus brought opposite the cap.

Q. What happens as soon as the extractor reaches its highest position?

A. The side plate springs engage in grooves in its sides to prevent the horns falling below and fouling the front end of the solid cams in the breech casing at the commencement of the backward movement, when (a) the side levers are released from the extractor levers (b) the side or extractor levers are worn. This, however, can only occur when there are no cartridges on the face of the extractor.

Q. What is the effect of the further downward movement of the connecting rod and side lever head?

A. It causes the lock to be forced slightly further forward, and the breech is then closed. During this movement steps on the side levers travel over bends on the extractor levers.

FIRING ACTION.

Q. Describe the firing of the first shot.

A. As the side lever head is brought slightly below the horizontal, it depresses the sear, thereby disengaging it from the firing pin, which then moves slightly forward until the bent of the tumbler engages the nose of the trigger. If the safety catch is raised and the thumb piece on the firing lever pressed, the pawl near the bottom of the firing lever pushes forward the bottom of the trigger bar lever. This, being pivoted in the centre, causes the top to come to the rear, engaging a projection on the trigger bar and drawing it to the rear. As the trigger bar is drawn backwards, the front end of the slot

engages and draws back with it the tail of the trigger, thereby releasing the tumbler. The long arm of the lock spring then propels the firing pin on to the cap and the cartridge is exploded.

Q. How are subsequent shots fired?

A. The firer, by maintaining pressure on the thumb piece, holds back the trigger bar. Therefore, each time the lock goes forward the front end of the slot holds back the tail of the trigger before the lock is quite home. By this means the nose of the trigger is prevented from engaging in the bent of the tumbler. When the lock is home, the side lever head depresses the sear, thus permitting the long arm of the lock spring to carry the firing pin on to the cap, and the charge is exploded. The depression of the sear is so timed that the firing pin cannot be released until the lock is in the firing position.

Q. What is the effect on releasing the thumb piece?

A. The short arm of the lock spring forces the nose of the trigger under the bent of the tumbler, so that, when the sear is depressed,

the nose of the trigger engages in the bent of the tumbler, and the firing pin is unable to go forward.

UNLOADING.

Q. How is the gun unloaded?

A. Pull the crank handle on to the roller twice in succession (without pulling the belt), letting it fly forward to the check lever each time; release the top and bottom pawls and remove the belt from the feed block—then release the lock spring.

MACHINE, FILLING BELTS, MAXIM .303-INCH, MARK II.

BELT-FILLING MACHINE.

Description.—The belt filling machine is designed to place the cartridges expeditiously and evenly in the ammunition belts, and is constructed so that it may be readily clamped on to the most convenient place.

The chief parts are the bed plate, pocket opener, removable crank handle with fixing

pin and chain, crank, connecting rod, cam bar, hopper, traversing gear, hinged loading tray, and hinged leg.

In the Mark I machine the crank handle is not made removable; also the loading tray and leg are not made to fold in the centre.

Weight of machine complete with hopper, 19 lbs.

Weight of loading tray and leg, $4\frac{3}{4}$ lbs.

Instructions for use.—The machine must be fixed, so that the crank handle can be worked with the right hand. The loading tray and the leg should be unfolded. The leg should be made rigid by turning up the keeper plate on to the pin catch, and the loading tray secured to the left of the bed plate by means of the pin, which is attached by a chain to the former. Turn the steel guide plate on the bed plate outwards; see that the pocket opener is back far enough to clear the belt; place the belt behind the roller and into the belt guide, the edge of the belt to be touching the side of the guide, the projecting ends of the long brass strips to point away from the cartridge plunger and to pass under the steel guide. The pawl lies on the top of

the belt. Turn the steel guide plate into position again, and draw the belt through with the left hand until the first pocket is opposite the pocket opener. Fill the hopper with cartridges, and replenish as required. On revolving the crank handle, the pocket opener will enter the first pocket and open it; on continuing the motion, the pocket opener will be withdrawn, and the cartridge plunger will push the lowest cartridge from the column of cartridges into the pocket, the pawl will then feed the belt along, and these motions will be repeated until the belt is filled.

A light pressure should be kept on the belt with the left hand until the weight of the filled portion of the belt is sufficient to assist the pawl. The angle of inclination of the loading tray is an important factor in this, and requires careful adjustment.

N.B.—Great care should be taken to see that the pocket opener enters the pocket each time, otherwise it may pierce and spoil the belt. On this account the crank handle should be held lightly and not turned too fast.

It is advisable to check the crank handle momentarily at the point where the pocket opener is about to enter a pocket.

INSTRUCTIONS FOR CLEANING AND POINTS TO BE OBSERVED WHEN THE GUN IS IN USE.

Q. What mixture is used for cleaning the mechanism?

A. Equal parts of Russian petroleum and paraffin.

Q. When parts are clogged with dried oil what is used?

A. Spirits of turpentine, and again slightly oiled after cleaning.

Very little oil should be used for this purpose, as it is apt to catch the dust and clog.

Q. For what purpose will hanging the lock be found useful?

A. The plan of hanging the lock and moving the recoiling portion by pulling on the crank handle, affords a ready means of oiling the recoiling portion and the bearing parts of the barrel, viz. (a) just in front of the trunnion block (which can be got at by

removing the feed block), and (b) at the muzzle end in front of the packing gland.

Q. Describe how the lock is hung.

A. Pull the crank handle slowly backwards till the horns of the extractor drop into the steps on the rear face of the solid cams. The barrel and side plates can now be moved backwards by placing the thumb behind the knob of the crank handle and the two first fingers on the tail of the handle and rotating it.

Q. How is the barrel cleaned?

A. Open the cover, pull the crank handle over against the roller, raise the lock and let it go forward slowly and rest upon the top of the breech casing. Take off the outer casing and muzzle cup of the ball-firing attachment. Place a piece of flannelette, about 4 inches by 2 inches in each eye or slot of the cleaning rod, care being taken that the latter is surrounded with the flannelette, which should be well oiled; then insert the rod into the muzzle of the barrel, placing the movable bush on the muzzle, and pass it up and down till the barrel is clean; replace

the oiled flannelette by dry pieces, and finally pass freshly-oiled pieces through, leaving the barrel well oiled. If the flannelette is tight, and is pushed through the breech, it is necessary to reverse it before pulling it back, otherwise it will jam.

Q. What cleaning is necessary after the gun has been fired—

- (a) With ball ammunition?
- (b) With blank ammunition?

A. (a) When ball ammunition has been fired, daily cleaning of the barrel is necessary for at least ten days afterwards. Subsequent cleaning must depend on the discretion of the officer in charge of the gun; in a dry climate once a week should be sufficient, but in situations where the barrel is exposed to a moist atmosphere it may be necessary daily. The bore should at all times be left coated with oil.

(b) When the D.P. barrel has been used for firing blank ammunition it should be thoroughly cleaned as soon as possible and left coated with oil. Subsequent weekly cleaning should suffice, but this also depends on local conditions.

Q. Describe the purpose, and method, of using the double pull-through.

A. If slight rust or metallic fouling is present, take off the outer casing and muzzle cup of the ball-firing attachment. Remove the barrel, place the muzzle protector in position, and, having thoroughly oiled the gauze, drop the weight through the bore from the breech end. Fix the barrel in a vice or have it held firmly by two men, and, with the assistance of another man, pull the cord backwards and forwards until the fouling or rust is loosened; the barrel can now be cleaned with the cleaning rod and flannelette as described above. When the gauze fits too loosely to clean the grooves of the barrel, its diameter can be increased by inserting under each side narrow strips of flannelette or paper. When the gauze is worn out, it should be replaced by one of the spare pieces which are issued with each double pull-through.

POINTS TO BE ATTENDED TO BEFORE LEAVING CAMP OR BARRACKS FOR FIRING.

The surfaces on which all movable parts work should be thoroughly well oiled with petroleum, especially the following:—

Bearing parts of the barrel and all recoiling portions.

The lock guides on the side plates, also the working parts of the lock itself, especially the levers and extractor.

Face of the feed block and the edges of the guides inside the feed block.

Bearings of the crank, the extractor stop on the front cover, the curved ramps, lock guides and trigger bar on the inside of the rear cover, and the check lever.

Q. How would you ascertain whether the recoiling portion works freely?

A. Cock the lock, remove the fusee spring box and spring, turn the crank handle upwards, take hold of it with the right hand and the fusee with the left, move the recoiling portion, with the gun horizontal, back-

wards and forwards, to see that it works freely and also that the barrel goes close home forward. The weight necessary to move the recoiling portion should not exceed 4 lb.

Q. How would you test the weight of the fusee spring?

A. Replace the fusee spring and weigh it with the spring balance as follows: Take out the lock, place the loop of the spring balance over the knob of the crank handle, and, standing on the left side of the gun, press down the check lever with the left hand. Pull the balance vertically upwards, resting the wrist on the breech casing; the reading indicated when the crank handle commences to move will be the weight of the fusee spring. This weight should be between 7 and 9 lbs.

Q. Explain how the fusee spring is adjusted when found to be over or not up to weight.

A. If the spring is over, or not up to weight, adjust by means of the vice pin; generally six clicks (three revolutions) make a difference of about 1 lb. Turning the vice pin in the direction of the hands of a watch

decreases the weight, and vice versa. The tension of the fusee spring should always be kept as high as possible, consistent with maintaining the normal rate of fire of 500 rounds per minute.

Q. What attention should be given to—

(a) The barrel?

(b) The barrel casing?

A. (a) Examine the barrel by means of the mirror reflector to see that the bore is clear. Examine the lock, feed block, firing lever and safety catch.

(b) See that the barrel casing is filled with water. To fill casing, remove the screwed plug at the breech end, and also the cork plug, pour in the water, and replace the plugs. In climates where the temperature is likely to fall much below freezing point, not more than about 5 pints of water should be put into the barrel casing, and 20 per cent. of glycerine mixed with the water will prevent it from freezing quickly.

Q. What other points should be attended to?

A. Ensure that the handles have been filled with oil; ascertain that the case, spare parts box, and its contents, and the cleaning rod, are with the gun.

Q. How would the belts be examined?

A. Inspect the brass strips, see that the belts are correctly filled, and packed carefully in the ammunition belt boxes. Keep the belts dry if possible; should they get wet, lay them out to dry. New or stiff belts should be well plugged.

Q. Should the water in the barrel casing become frozen solid, on the gun being fired the barrel will probably not recoil far enough to work the gun, and will remain back. How will this be remedied?

A. Pull the crank handle on to the roller, then bring it back to a vertical position and force the barrel to the front, pulling the belt if necessary; let the crank handle return to the check lever and fire the gun. This should be repeated until the barrel recoils correctly.

POINTS TO BE ATTENDED TO DURING FIRING.

Q. What points are to be attended to during firing?

A. (a) See that a sufficient supply of water is kept in the barrel casing so that the barrel is never uncovered.

The water in the barrel casing begins to boil when the gun has fired about 600 rounds with the greatest rapidity; after this, if the firing is continued, the amount of water evaporated is about $1\frac{1}{2}$ pints for each 1,000 rounds. When the barrel casing is filled with water, about 2,000 rounds may be discharged at short intervals without replenishing, but this depends upon the rapidity with which the gun is fired.

(b) The belt is on no account to be pulled when the gun is firing.

(c) During a temporary cessation of fire, oil the lock and all frictional parts, remove a partly used belt and replace it by a full one. See that the clamps of tripod legs have not worked loose.

(d) Keep the belt always in line with the feed block and the ammunition box, if possible, up to, but not above, the cross head-joint pin.

(e) See that belts are refilled without delay.

POINTS TO BE ATTENDED TO AFTER FIRING.

Q. What points are to be attended to after firing?

- A.* (a) See that the gun is unloaded.
 (b) See that the chamber and bore are well oiled immediately after firing.
 (c) See that the lock spring is released.
 (d) See that any live cartridges that happen to be among the cases are collected.

Q. What action should be taken on return to barracks?

A. The gun and barrel should be thoroughly cleaned as soon as possible. The water must be drained out of the barrel casing.

The lock should be examined to ensure that it is not damaged. The barrel must be removed and carefully dried and oiled, the outside of the barrel being oiled as well as the bore. Ammunition belts should be examined and if wet or damp should be hung up to dry.

STOPPAGES.

Q. How are stoppages in the automatic action of the gun during firing classified?

A. Under two main headings (*a*) Temporary, (*b*) Prolonged.

Q. What are "temporary" stoppages due to?

A. (*a*) Failure of some part of the gun of which a duplicate is carried and which therefore can be easily and quickly replaced, or faulty ammunition.

(*b*) Some cause which can generally be avoided by a high standard of training and a thoroughly knowledge of their gun by the detachment. These are generally due to neglect on the part of the detachment of some of the points to be observed before, during, and after firing.

Q. What is the cause of "prolonged" stoppages?

A. Failure of some part of the gun which cannot, as a rule, be put right by the detachment under fire or without skilled assistance. These necessarily put the gun out of action for a more or less prolonged period.

Q. On what will depend the rapidity with which "temporary" stoppages can be overcome?

A. On the knowledge and training of the detachment.

The following table of temporary stoppages, set out under five columns, gives a clear indication of the method to be employed in teaching the detachment the practical side of the mechanism. Column I shows the four positions of the crank handle when the gun stops firing. The first three positions may vary slightly, as shown by the dotted lines. These positions, which afford a ready indication of the cause of stoppage—and therefore of the correct "immediate action" to be performed—must be recognised clearly before the instruction proceeds.

At this stage the detachment should not be required to know what these four positions indicate. The indication given below the diagram will be explained when the probable causes of the stoppages are being taught.

Column II gives a detailed description of the "immediate action" to be performed by the firer (sometimes with the assistance of No. 2) as soon as the position of the crank handle has been recognised after the gun has stopped firing.

Column III deals with the probable causes of these stoppages, but it is of first importance that the instructor does not proceed to this stage until he is assured that every "immediate action" can be correctly and immediately carried out without the slightest hesitation or forethought.

A thorough knowledge of the causes of temporary stoppages will not only give the detachment a practical knowledge of the working of the gun, but will also be a help in the discovery of the cause of any unusual breakdown which may occur.

In Column IV is given the method for preventing the recurrence of certain stoppages,

the cause of which may be only temporarily cured by the immediate action. It will sometimes be possible to carry out these preventions in two or three minutes; at other times their execution may cause the gun to be temporarily out of action for a longer period; but in either case, no skilled assistance or special appliances other than those carried with the machine gun section will be required.

Column V shows how the various temporary stoppages can be simulated for instructional purposes. It is unnecessary to teach these methods of preparation to the machine gunner, but every instructor must have a thorough knowledge of this column in order to teach the correct "immediate action" for any temporary stoppages.

Q. How is instruction given on this point?

A. A belt and dummy cartridges will be *invariably* used, and in order to simulate the various stoppages, empty cases, bulged dummy cartridges, separated cases, and dummy cartridges with the rims thickened, will be required by

the instructor. It is also necessary that a spare lock, feed block, belt, and a clearing plug, are by the gun, without which the correct immediate action cannot always be carried out.

Q. Why is it important that the gun should be re-laid after the clearing of a stoppage?

A. Because the clearing of a stoppage often knocks the sights off the aiming mark.

POINTS TO BE OBSERVED.

In addition to the instructions conveyed in the table, the following points should be observed:—


(i) If, when the cover is opened to investigate the cause of stoppage, it is seen that the extractor is not quite up, no attempt should be made to raise it. On the contrary, it should be first pushed down before the crank handle is turned over to the roller, as by this means all risk of firing a cartridge accidentally is avoided.

(ii) When a temporary stoppage necessitates the employment of a spare lock, feed

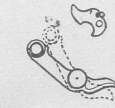
block, etc., the part which has been removed should be repaired as soon as possible, so as to make it again available as a reserve.

(iii) Should it ever be necessary to release the lock spring with the lock out of the gun, this should be done with the extractor fully up, and the firing pin hole opposite the firing pin.

TEMPORARY STOPPAGES, GUN, VICKERS, .303-INCH.

Position of Crank Handle and its Indication.	Immediate Action.	Probable Cause.	Prevention of Recurrence.	Method of Preparation for Instructional Purposes.
 I <i>Indication.</i> —The lock is unable to come back far enough to allow the extractor to drop.	(i) Turn the crank handle on to the roller, pull the belt to the left front, and let go the crank handle. (ii) If failure recurs lighten fusee spring by 3 "clicks."	The extractor has not dropped. This may be due to :— (a) Too heavy fusee spring. (b) Excessive friction, due to want of oil ; (c) Tight pockets in the belt, or excessive packing in the cannelture or packing gland.	(b) Clean and working parts. Examine the belt, which should be dried if damp; or if the stoppage is due to a new or stiff belt, the pockets should be plugged. If due to excessive packing, examine, and repack cannelture or packing gland.	Perform half the loading motions; pull the crank handle slowly back until the horns of the extractor have engaged with the steps on the solid cams; pull the belt to the left front, and let go the crank handle. <i>For Range Purposes 3.</i> —Increase the weight of the fusee spring.

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II

Indication.—The lock is unable to go fully home after re-coil.

(i) Force the crank handle to the rear; open the rear cover and examine the cartridge on the face of the extractor. If a damaged cartridge, or an undamaged cartridge with the front portion of a separated case adhering to it, clear the face of the extractor and reload. (ii) If an undamaged cartridge, with no front portion of separated case adhering to it is found on the face of the extractor, clear the face of the extractor, replace the lock, keeping the crank handle on the roller.	(c) Partial loss of the force of the explosion due to :— (i) Worn barrel (ii) Defective ammunition. (i) (a) Damaged cartridge. The cartridge is unable to enter the chamber completely although it has commenced to do so. (b) Separated case with front portion adhering to undamaged aged cartridge. (ii) Separated case. The front portion of the case causes an obstruction and prevents the next cartridge going in, to the chamber.	(c) (i) The barrel should be examined at the first opportunity, and, if much worn in the lead, should be changed. (b) If a succession of separated cases occur, cut the connecting rod must be lengthened (see page 78).	(a) Bulge the leading dummy cartridge in the belt and load. <i>For Range Purposes.</i> —Place a bulged dummy cartridge in the belt. (b) Perform half the loading motions. Open the rear cover, withdraw and lift up the lock. Place the front portion of a separated case over the bullet of the cartridge on the extractor. Replace the lock, close the rear cover, pull the belt, and let the crank handle go slowly forward.
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Position of Crank Handle and its Indication.	Immediate Action.	Probable Cause.	Prevention of Recurrence.	Method of Preparat on for Instructional Purposes.
	Take the clearing plug (seeing that the centre pin is back) and insert it into the chamber. Push the pin well home by allowing the lock to go forward. Then, keeping a firm pressure on the crank handle, give the clearing plug a rocking motion; withdraw the lock; lever back the handle of the clearing plug and withdraw it (seeing that the front portion of the separated case is on the clearing plug) and reload.	(i) Excessive friction.	(i) Clean and oil working parts.	<i>For Range Purposes.</i> —File a cart-ridge about one inch from the base, and insert in the belt. Care must be taken that the cart-ridge is not filed too far through, as there is the danger of the bullet being left in the barrel.
	(i) Strike the crank handle on to the check lever by a glancing blow with the palm of the hand.			(i) Perform the correct loading motions, except that when completing the loading the crank handle

III

Indication.—The extractor is unable to rise to its highest position. If the feed block slide is jammed, there is a fault in feed.

(ii) If (i) fails, slightly raise the crank handle, pull the belt to the left front, let go the crank handle, and then strike it down on the check lever.

(ii) A cart-ridge is fed up slightly cross-wise or a long brass strip is bent.

(ii) Carefully examine the belt.

must be eased forward gently until it is in the 3rd Position (see diagram, col. 1).

For Range Purposes.

—Lighten the fuse spring.
(ii) Perform half the loading motions. Pull the crank handle on to the roller. Open the rear cover, pull a cartridge half way into position in the feed block and hold it there, and let the crank handle go slowly forward. Close the cover.

For Range Purposes.

—Bend a long brass strip.

(iii) A. If (i) and (ii) fail, examine feed block slide; if jammed, No. 1 pulls the crank handle on to the roller; (*), holds it there and unlocks the front cover. No. 2 opens the front cover, and with the

(iii) A. (i) Carefully examine belt.

(iii) A. (i). Pull out the fourth cart-ridge in the belt about $\frac{1}{2}$ -inch. Perform half the loading motions; pull the crank handle slowly back until the horns of the extractor have engaged with

Position of Crank Handle and its Indication.	Immediate Action.	Probable Cause.	Prevention of Recurrence.	Method of Preparation for Instructional Purposes.
	<p>assistance of No. 1 raises the feed block sufficiently to allow the recoiling portions to go home. He releases the top and bottom pawls from the belt, which he withdraws until the top cartridge is clear of the feed block and rectifies the belt or cartridges if necessary. He replaces the feed block, pushing the slide over to the left, and lowers the front cover. No. 1 locks the front cover, pulls the belt to the left front, and releases the crank handle.</p> <p>(*) <i>N. B.</i>—In order to do this, it may sometimes be necessary for No. 2 to open the front cover and force down</p>	<p>tering or passing freely through the feed block.</p> <p>(iii). A. (ii). Belt box not being in line with the feed block, the belt</p>	<p>(iii). A. (ii). See that the belt box is in line.</p>	<p>the steps on the solid cams. Draw the recoiling portions to the rear by forcing the knob of the crank handle forward, and tail to the rear, at the same time pulling the belt to the left. Allow the recoiling portions to go forward. Bring the crank handle on to the roller and let go. <i>For Range Purposes.</i> —Fill a belt badly.</p> <p>(iii). A. (ii). <i>For Range Purposes.</i>—Place the belt box at an angle to the feed block.</p>
the horns of the extractor.	(iii). B. If free No. 2 opens the front cover and forces down the horns of the extractor. No. 1 clears the face of the extractor, and changes the lock. He removes the cartridge in position in the feed block and reloads.	<p>does not lead up correctly to the feed block and becomes jammed.</p> <p><i>Note.</i>—The effect of a fault in feed is that the top pawls, being engaged behind a cartridge in the belt, are held fast, when some obstruction, such as above, prevents the belt from passing freely through the feed block. The recoiling portions, being connected by the top and bottom levers to the slide, are arrested and prevented from going home. The distance they are held back depends upon the point at which the obstruction asserts itself.</p> <p>(iii). B. (1) Damaged cartridge grooves. (2) Broken gib spring. (3) Broken gic. In these cases the extractor is prevented from</p>	<p>(iii). A. (ii). See that the belt box is in line.</p> <p><i>Note.</i>—The effect of a fault in feed is that the top pawls, being engaged behind a cartridge in the belt, are held fast, when some obstruction, such as above, prevents the belt from passing freely through the feed block. The recoiling portions, being connected by the top and bottom levers to the slide, are arrested and prevented from going home. The distance they are held back depends upon the point at which the obstruction asserts itself.</p>	<p>(iii). B. Damage the rim of the second dummy cartridge in the belt. Proceed to load. <i>For Range Purposes.</i> —Damage the rim of a dummy cartridge, and place it in the belt.</p>

Position of Crank Handle and its Indication.	Immediate Action.	Probable Cause.	Prevention of Recurrence.	Method of Preparation for Ins ructional Purposes.
		rising to its highest position. It may be necessary sometimes to slide the cart-ridge upwards when clearing the face of the extractor.		<i>Notes.</i> — (1) As damage to the extractor has to be simulated by damaging a cartridge rim, this cartridge must be removed before reloading.
	(a) Turn the crank handle on to the roller, pull the belt to the left front and let go the crank handle. (b) If (a) fails, place crank handle on to the	(4) Thick-rimmed cart-ridge. <i>Note.</i> — If it is apparent that the stoppage is due to a thick-rimmed cartridge, it will not be necessary to change the lock.		(2) This stoppage should seldom be practised <i>on the range</i> , since the thickened rim may cause damage to the grooves.
		(a) (1) No cartridge in the chamber. (2) Defective ammunition. (b) (1) Broken or damaged		(a) Load and press the thumb pieces. <i>For Range Purposes.</i> — Place a dummy cartridge in the belt. (b) <i>For Range Purposes.</i> — The effect of



IV

Indication. — That there has been no explosion, or if any, that there has been little or no recoil, the lock remaining in its forward position.

roller twice, change the lock and reload.

firing pin.
(2) Broken lock spring.

these will be simulated by placing two dummy cartridges in the belt.

Note. — Worn or damaged side or extractor levers may result in the extractor being unable to rise, or, if the side levers are bent, there may be either a succession of separated cases, or the lock may become jammed.

PROLONGED STOPPAGES.

The causes of *prolonged* stoppages are so varied that they cannot be set out in detail. The following is, however, of importance, and should be known by all men of the detachment.

Parts of the locks damaged, no spare part being available.—The gun will fire without the sear, or if the bents of the sear or firing pin are badly worn or broken off, but only single shots, and only by pressing and releasing the double button quickly.

The gun will also fire if the nose of the trigger or bent of the tumbler is badly worn or broken off, but only rapid firing. In this case the gun will fire the instant the crank handle reaches the check lever, although the double button has not been pressed.

The gun can be worked as follows:—

(a) Group the cartridges in the belt, say 20 or 30 rounds each group.

(b) Lay the gun before commencing to load, pull crank handle on to roller, pull belt to left and let handle go; repeat, but before allowing the handle to reach check lever and

the gun to fire, grip the rear crosspiece with left hand to control gun in the ordinary way.

If necessary firing can be stopped by throwing the filled end of the belt over the breech casing to the left. When the firing has been stopped as above described, hold the crank handle with the right hand, open the rear cover, press down the horns of the extractor, draw the lock back, and, if there is a live cartridge on the face of the extractor, remove the feed block and belt, close the cover and allow the lock to fly forward, when the live cartridge, which is on the face of the extractor, will be fired automatically. The lock can then be changed with safety. On no account should the lock be allowed to fly forward until the feed block has been removed and the cover closed. If, on drawing the lock back, it is found that there is no live cartridge on its face, the lock may be changed at once, and the necessity for removing the feed block and the subsequent precautions, will not arise.

GENERAL INSTRUCTIONS FOR THE MAINTENANCE AND PRESERVATION OF GUNS.

The manner in which machine guns are dealt with as equipment in the Land Service is laid down in Equipment Regulations as under:—

Regular Army, Parts 1 and 2.

Special Reserve, Part 1, and Section XVI, Part 2.

Territorial Force, Part 3.

For cleaning and oiling guns and mountings in the hands of the troops, the following stores are allowed per annum in peace, for one gun and its mounting:—

Dubbing ... ..	...	$\frac{1}{4}$ lb.
Flannelette, Mark III. ...	...	11 yards.
Linen or cotton, old ...	...	3 lbs.
Oil, Mineral, burning ...	...	$\frac{1}{2}$ pint.
Oil, Petroleum, Russian, lubricating ... ..	...	8 pints.
Turpentine, spirits of ...	...	1 pint.
Soap, yellow ... ..	...	4 bars.

When guns are returned to store, packed for transmission, or stowed away in any place where they cannot be readily examined, the barrels and unpainted parts should be coated with "Composition, preserving, arms." The mixture is to be made hot, and a piece of flannel dipped in it, with which the exterior parts will be dabbed. To coat the inside of the barrels, draw a bunch of lamp cotton, well saturated with the mixture, through from both ends. The lamp cotton is to be attached to a piece of twisted copper wire.

In frosty weather the working parts of the gun should only be slightly oiled with a lightly-oiled rag.

History sheet.—A memorandum of examination or history sheet accompanies each gun when issued. It will be carefully preserved and will be handed over with the gun to which it belongs whenever the gun is transferred from the charge of one officer to that of another, particulars being duly recorded. An immediate record will be made in the sheet of any accident which may happen to the gun, and of the result of each official examination it may undergo. On every occa-

sion on which ball ammunition is fired the number of rounds fired will be shown, the number of the barrel being inserted in the column of remarks.

Barrels.—A new or part-worn, but serviceable, barrel is issued as a part of each gun. This barrel is only to be used for firing ball ammunition.

An old barrel, marked D.P., is also issued, to be used only for drill purposes. A second old barrel, marked D.P.B., is issued, to be used only for firing blank ammunition. Its chamber is bushed to take the special blank ammunition. On mobilisation these three barrels are to be returned to store. In addition, two new barrels are issued with each gun and are to be kept in store and only taken into use on mobilisation, one in the gun and one spare. New barrels in store are distinguished by a band of white paint round the centre.

EXAMINATION, REPAIRS AND ADJUSTMENTS.

EXAMINATION.

Q. How is the recoiling portion tested?

A. See that it moves freely. Pull not to exceed 4 lbs.

Q. For what purpose would you examine the—

(a) Foresight?

(b) Tangent sight?

(c) Safety catch?

A. (a) See that the blade is in good condition.

(b) See that the top edge and U on slide are in good condition, and that the slide works correctly.

(c) See the spring and catch act automatically when the firing lever is released.

Q. How would you test the firing lever?

A. By seeing that the trigger bar does not release the trigger before the safety catch is clear, and also see that the trigger is released

before the stop on the lever bears against the stop on the rear crosspiece.

Q. How would you test the connecting rod?

A. Test whether correct length with both locks as follows:—Take off the fusee spring, raise the cover, turn the crank handle back and remove the lock. Place one of each of Nos. 1 and 2 washers on the outer face of the adjusting nut on connecting rod. Replace the lock on the connecting rod and let it down into the gun, retaining the lock in its rear position. The extractor being down, insert, through the opening in the underside of the breech casing, the *special armourers' machine gun dummy cartridge in the bottom end of the extractor over the firing pin hole. Push the extractor right up to the upper stop, and, still retaining hold of the cartridge, see that the barrel is home; then turn the crank handle over towards the check lever, at the same time guiding the cartridge into the chamber. Push the check lever back just clear of the crank handle and let the crank handle gently down towards rest. If the con-

*In the absence of this a "gauge, distance of bolt-head from chamber, .064-inch," may be used.

necting rod is within limit for strength, a check will be felt. If no pressure is required, it shows that the lock is not fully home (i.e., the connecting rod is not long enough, and therefore outside the limit). If within limit, remove the washers. If outside the limit, washers must be fitted permanently to the connecting rod (see page 78).

No. 1 washer is plain. No. 2 washers of later manufacture have two small holes punched in the rim.

Q. For what purpose would you examine the barrel?

A. To see to the condition of bore, rifling, lead and exterior.

Q. Explain fully how the lock would be examined.

A. Test the extractor and side levers by bringing the crank handle gently on to the check lever. If the levers are correct, the extractor will be right up. Test the bents of the sear and firing pin. To do this, pull the crank handle on to the roller, then bring the crank handle gently down on to the check lever. The extractor should be well up to the top position before the sear is released.

Examine the face of the extractor for burrs and flaws, at the gib gap and firing pin hole. Try the grooves with a dummy cartridge (armourers' dummies must be used for this purpose) to see the gib holds the cartridge horizontally. See that the nose of the trigger and bent of the tumbler are not too much worn. See that the point and bent of the firing pin are in good condition. A broken firing pin can be recognised without stripping the lock by releasing the lock spring with the extractor up. If correct, the firing pin will then protrude from the firing pin hole and can be withdrawn by raising the tail of the tumbler. If it does not protrude, or, if protruding, the point is not withdrawn when the tail of the tumbler is raised, the firing pin is broken.

Q. What points would be looked for generally?

A. That all axis pins are correct.

REPAIRS AND ADJUSTMENTS.

Stripping the gun.—The gun is stripped in the following order, the gun being on the mounting.

NOTE.—Operations marked with an asterisk will only be performed by an armourer.

Lock.—Clear the extractor by revolving the crank handle twice; raise the rear cover, pull the crank handle on to the roller; see that the extractor drops, place the finger between the extractor and stop and lift the lock—at the same time allowing the crank handle to move slowly forward until the lock is released from the side plates. Give the lock $\frac{1}{8}$ turn and lift it out.

Block, feed.—Raise the front cover and lift out.

Box, fusee spring.—With the right hand at the rear and the left hand at the front, press the box forward until clear of the lugs and remove. Disconnect the fusee chain and remove the box and the spring.

Fusee.—Turn the fusee to the rear until the lugs on the stem are free to be withdrawn.

Ball-firing attachment.—Withdraw the split pin. Give the outer casing $\frac{1}{8}$ turn and remove it. Unscrew the front cone.

Loosen the clamping screw of the muzzle cup and revolve the cup till the clamping screw coincides with the flat on the barrel. Remove the muzzle cup. Unscrew and remove the gland and packing.

Recoiling portion.—Raise the rear cover, unscrew the rear crosspiece T-fixing pin, and hinge down the rear crosspiece; remove right and left slides, and draw out the recoiling portion. Disconnect the side plates from the barrel (removing the left one first).

* If necessary, by taking out the fixing pin, the crank handle can be driven off with a drift and hammer, but as a rule this should not be stripped.

Roller.—Remove split fixing pin, collar and roller.

* *Lever, check.*—Drive out the keeper pin from the underside, and take off the check lever. To remove the piston and spring, turn the piston—by using a screwdriver in the slot—until its lugs are free to pass along the slots, when the piston will be forced out by the pressure of the spring.

* *Sight, tangent.*—Unscrew the axis pin and force it out. Remove tangent sight, piston and spring.

Lock, cover, rear.—Unscrew the axis pin and force it out. Remove the cover lock and spring.

Trigger bar.—Remove the spring and withdraw the trigger bar.

* *Covers, front and rear.*—Remove the keeper pin and check nut, and force out the joint pin.

* *Catch, cover, front.*—To remove the spring and plunger, force the plug forward and give $\frac{1}{4}$ turn by means of a screwdriver, when the plug will be forced out by the spring. Before removing the plunger it must be turned so that the slots are free to pass the lugs in the catch. If necessary, by taking out the keeper pin the catch can be taken out, but as a rule it should not be removed.

* *Rear crosspiece.*—Remove the keeper pin and check nut, and force out the joint pin.

* *Sight, fore.*—The position of the foresight should first be carefully marked; drive the foresight out of the dovetail seating through the right-hand opening in the protector.

Take out elevating and crosshead joint pin and remove the gun from the mounting.

Steam tube.—Up-end the gun so that it stands on the rear end of the breech casing.

Remove the keeper screw and unscrew the steam tube, using the special tool provided for the purpose. (This should not be moved if the valve is free.)

* *Shutter, sliding.*—Press in the catch and force the shutter to the front until it is against the stop, then press in the plunger with the No. 3 punch and further force the shutter forward until it is clear of the breech casing.

ASSEMBLING THE GUN.

Reverse all the foregoing operations with the exception that the recoiling portion must be replaced before the front packing and gland.

Care must be taken when re-assembling the steam tube that the acorn end is inserted into its seating in the barrel casing.

This is more easily assured by keeping the acorn end in contact with the adjacent channel formed by corrugation of the barrel casing.

The tube should screw home freely when in the correct position.

STRIPPING VARIOUS COMPONENTS.

Q. How would you strip the lock?

A. See that the lock is cocked; force out the side lever split pin and axis bush; remove side levers, extractor levers and extractor. Release the lock spring and push out the trigger and tumbler axis pins; remove trigger, tumbler, lock spring, firing pin and sear with spring.

Q. How do you strip the extractor?

A. Push out the gib spring cover and remove spring and gib.

Q. How is the lock assembled?

A. Reverse the above, except in the case of the lock spring, which must be forced home, long arm towards the extractor, when the lock is in the fired position, and when all the other parts are assembled.

NOTE.—The firing pin should never be released unless the extractor is up to the top stop.

Q. How is the feed block stripped?

A. Force out the split pin and separate the top and bottom levers, take out the slide and remove pawls and spring.

Draw out the bottom pawl axis pin and remove spring and pawls.

Q. How is it assembled?

A. Reverse the above.

Q. How would you strip the rear cross piece?

A. Unscrew the firing lever axis pin and remove the firing lever. Unscrew the safety catch axis pin; remove the safety catch and spring with piston; lift out the trigger bar lever. To assemble, reverse the above. (See that the pawl engages the trigger bar lever.)

Q. How would you strip the tangent sight?

A. Remove the fixing screws, graduated plate, milled head and slide spring; drive out the pawl fixing pin; take off the pawl; push out the pinion and remove the slide.

Q. How is it assembled?

A. Reverse the above.

RENEWAL OF PACKING.

Q. How is the packing at the breech and the barrel renewed?

A. Should the gun leak at the breech, empty the barrel casing. Draw out the recoiling portion as directed above. Wind a strand of asbestos (part of a 5 yards piece) in the cannellure of the barrel, pressing it together with a thin piece of wood or the point of a screwdriver or knife, until the cannellure is full, then oil the asbestos and re-assemble the parts.

Q. How is the packing at the muzzle end of the barrel renewed?

A. Should the gun leak at the muzzle, stand the gun on the rear crosspiece, remove the ball-firing attachment, unscrew the gland and repack, or, if necessary, replace the asbestos, having first oiled it, by winding it loosely round the barrel, and whilst winding, push it in with punch No. 2, a piece of wood, or any blunt-ended instrument which will fit; screw on the gland, as tightly as can be done by hand, return the gun to horizontal position, hang the lock, and work the recoiling portion backwards and forwards to ensure that it moves freely. If the packing is found to press too hard on the barrel, the gland should be removed and one or two strands taken out of the asbestos.

INSTRUCTIONS FOR FITTING WASHERS TO CONNECTING ROD.

Q. How are washers fitted to connecting rod when required?

A. Take off the fusee spring. Raise the cover, turn the crank handle back and remove the lock. Turn the connecting rod back on

to the trigger bar lever, then with the combination tool unscrew and remove the adjusting nut from the connecting rod. Place one of each of Nos. 1 and 2 washers on the shoulder of the connecting rod and screw the adjusting nut tightly home on to the washers.

Place one more of each of Nos. 1 and 2 washers on the outer face of the adjusting nut and test the length of the connecting rod.

SPARE PARTS AND IMPLEMENTS.

Q. How are spare discs fitted for the ball-firing attachment?

A. Unscrew the front cone. Cut the front bevel of the disc across with a chisel, driving sufficient metal up to provide a hold for the pliers. Remove the disc and replace it with a new one. When assembling a new disc it may be necessary to tap the front cone lightly while screwing the disc home.

Q. How is the tool used for repairing belts?

4. Remove the damaged strips and eyelets. If a long strip requires fitting, first join the two portions as follows:—Place an eyelet in the hole of the dished end. Insert the punch of the tool into the unopened end of the eyelet, the opened end to rest upon the die, and gently press the handles together. Then put the punch in the other end of the eyelet and press the handles; then, keeping the belt horizontal, move the handles of the tool backwards and forwards in a circular direction with the punch of the tool as the centre, so as to shape the head of the eyelet nicely. Put the strips into position on the belt, insert the eyelets, and repeat the above operation. Short strips are fitted in a similar manner, except that they do not require joining at one end previous to placing them upon the belt. Care must be taken to press the eyelets as far through the strips as possible before using the tool in order to form a good head.

MOUNTING, TRIPOD, .303-INCH MAXIM GUN, MARK IV.

(PLATE I.)

The mounting consists principally of a crosshead (*a*), elevating gear (*b*), and socket (*c*), mounted on three legs.

It is constructed to give 13 degrees elevation and 25 degrees depression at heights varying from 14½ inches* to 30 inches from the axis of the gun to the ground. By arranging the position of the rear and front legs respectively, elevation may be given up to about 43 degrees and depression to 55 degrees. An all round traverse can be obtained.

The crosshead (*a*), to which the gun is pivoted, is formed with a pivot to fit into the socket (*c*) and an arm (*d*) which carries the elevating gear (*b*).

The elevating gear, which is actuated by a handwheel (*v*), consists of an inner and outer screw (right and left-handed) and a nut working within a tumbler (*g*). The tumbler

* See Plate I.

is split and provided with a jamming bolt (*h*), by which the wear may be taken up. A chain secures the inner screw to the crosshead to prevent loss while travelling.

The socket (*c*) is bored to receive the crosshead and is provided with three lugs (*n*), to which the legs are hinged; a jamming block and screw with handle (*f*) is attached to the front to secure the crosshead in any desired angle of traverse; the block works in a recess in the upper portion of the crosshead and prevents it from rising. Both faces of the rear lug and one face of each front lug are fitted with clutch plates having radial serrations to correspond with similar serrations on the faces of the leg joints. Joint studs with disc spring and jamming handle (*s*) are fixed to the front lugs, by which the legs are securely clamped to the socket in the required position.

The legs (*j*, *k*) are of tubular steel, the lower ends being fitted with shoes (*m*) to steady the mounting on the ground, and the upper ends having a joint with radial serrations mentioned above. The rear leg is provided with a joint pin with nut and jamming handle (*t*).

On a portion of the periphery of the leg joints numbers are stamped at regular intervals, so that when read in conjunction with a zero mark the relative position of the legs to their normal position may be readily seen.

A strap is fixed to the rear leg to secure the three legs during transport.

When firing, the ammunition box is placed on the ground on the right side of the gun.

Weight of mounting ... 48 lbs.

The Vickers gun can be fired from service mountings.

BAR, CARRYING MAXIM GUN ON TRIPOD, MARK I.

The bar is of bamboo, with a leather strap, 1 inch by 22 inches, attached by copper wire at the middle. It is for moving guns on tripods short distances without dismounting the gun.

In use, the bar is placed under the rear end of the barrel casing, and secured by the strap. The gun and mounting can then be

removed by three men—one at each end of the bar, and one to hold either the rear leg of tripod or cross piece of gun.

Length 3 ft. 6 ins.

Weight (about) 2 lbs.

HOODS, PROTECTING:—

MARKS II AND IV TRIPOD GUN MOUNTS.

The hoods are made of leather, lined with brown felt, and are for use in protecting the gun mount when tripods are carried in G.S. limbered wagons.

THE TRAINING OF MACHINE GUN SECTION.

The two non-commissioned officers and twelve privates shown in the establishment of a machine gun section will be trained as the battalion machine gun section. Two non-

commissioned officers and twelve men in addition will be trained, as opportunity offers, as a reserve section to replace casualties.

DRILL OF THE MACHINE GUN SECTION.

ALLOCATION OF DUTIES.

The duties of the section officer are to command his section in accordance with his orders and the tactical situation; select gun positions to observe, and to control fire generally; to regulate the ammunition supply, and to give instructions regarding the movement of unlimbered wagons. When guns are brigaded, he acts under the instructions of the brigade machine gun officer, to watch for signals and acts as the brigade machine gun officer may direct.

The duty of the sergeant is to supervise guns coming into action as the section officer may direct. He must be prepared to take command of the section in the event of the officer becoming a casualty.

The corporal is generally responsible for the packing and contents of the limbered wagon. On the line of march he marches behind it and works the brake as required. On the order to unpack he will lower the tail-board, superintend the unpacking, and take command in the absence of the section officer or sergeant. He will see that Nos. 4 put their own rifles, as well as those of Nos. 1, 2, and 3, in the wagon. He will have the spare parts box handy, supervise the ammunition supply and filling of belts, direct the limbered wagon as required, superintend the filling of sandbags and cutting of brushwood, and watch for signals from the section officer. He will be prepared to take the place of the sergeant should he become a casualty.

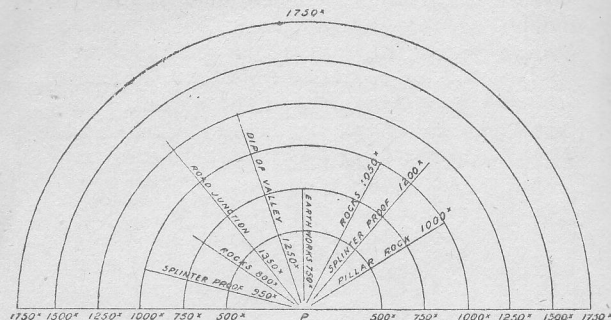
The following are the duties of the various numbers:—

No. 1 is the firer. He will personally clean and look after his gun, and ensure that the mechanism is working smoothly. On going into action he will carry the tripod and place it in a suitable position and assist No. 2 in mounting the gun. He repeats all orders received, observes his own fire, and makes

necessary alterations of elevation and direction.

No. 2 assists No. 1 at the gun, carries the gun into action, and mounts it with the assistance of No. 1. In action he will attend to the feeding of the gun, watch for signals from the section or brigade machine gun officer, and generally assist No. 1.

Nos. 3 and 4 are ammunition carriers. No. 3 takes the first supply of ammunition to the gun, assisted by No. 4, and arranges that the spare parts wallet is brought up to the gun position. No. 4 takes the ammunition from the limber to No. 3, when a further supply is required, and also the condenser complete and half-filled with water. No. 3 is responsible that the condenser reaches the gun position before there is any chance of the water boiling. No. 4 places his own rifle and those of Nos. 1, 2, and 3, in the limber.



No. 5 acts as scout, as ordered by the section officer.

One No. 6 is the range taker. He will take ranges and prepare range cards. (See Plate.) The other No. 6 is a spare man, and acts according to the orders he receives from his officer.

In allotting the various duties, section officers should select the men who show a particular aptitude for each duty, and the next best should be those who would probably be most quickly available on service to

replace a casualty. The results obtained in Table "C," in Range Takers' Tests, and in Tests in Belt filling, will assist section officers in detailing the numbers, and for this purpose they will keep careful record of the characteristics and particular aptitude of each man. Nos. 1, 2, and 3, should be the best in that order of merit at laying and holding, Nos. 5 and 6 at range taking, and No. 4 at belt filling. In peace, the numbers should frequently change rounds, so that each may be trained in the duties of all numbers under various conditions.

The sergeant should similarly be practised in the duties of section officer and the corporal in the duties of sergeant.

Signalling.—Machine gunners should have a thorough knowledge of semaphore, and should pass periodical tests.

SECTION DRILL, WITHOUT TRANSPORT.

The guns, with tripod and ammunition boxes, will be placed on the ground, muzzles to the front and in line, legs to the rear, straps lapped round the rear leg and buckled,

and clamps sufficiently tight to prevent the legs from hanging loose when the tripod is lifted off the ground; the traversing clamp should be sufficiently loose to enable the gun to be deflected by a sharp tap with the hand on the rear cross-piece; guns on the right, ammunition boxes 3 paces in rear of the guns. The guns should be a convenient distance apart, but not closer than 8 paces.

On the command *Fall In* the detachments for the two guns will fall in in two ranks, 5 paces in front of the interval between the guns; the sergeant on the left of the front rank, covered by the corporal in the rear rank. The front rank will provide the right gun detachment, the rear rank the left gun detachment.

On the command *Number* the section will number off.

On the command *Take Post*, detachments turn outwards and double to their respective guns (the sergeant and corporal on the outer flank, where they can superintend). Nos. 1 and 2 fall in on the left of the tripod and right of the gun respectively, No. 3 on the

left of the ammunition box. If the ground is suitable, these Nos. should lie down.

Nos. 4, 5, and 6 fall in, in single rank, in rear of No. 3.

A landscape target should be placed about 25 yards from the guns. The instructor having pointed out a spot, not more than 5 yards away from where the guns are lying, where each gun will be mounted, will give the command *Mount gun*. No. 1, picks up the tripod, having previously seen that both elevating screws are exposed the same distance, carries it to the spot ordered, and places it in position. In adjusting the tripod, he must ensure that the cross head is upright, and that the legs are clamped tight. He must learn by experience the adjustment that suits him best for the position ordered and for the nature of the ground, so that he will not be cramped when firing, and will not have to alter the tripod after the gun has been mounted.

As soon as the tripod is nearly in position, No. 2 picks up the gun and carries it to the right side of the tripod, holding the rear cross piece with the left hand, with the gun

muzzle to the rear, under the right arm. He then kneels on the left knee, facing the tripod, and, supporting the weight of the gun on the right knee, places it on the tripod, drives in and turns down the cross head joint pin, and removes the cork plug from the steam escape hole. No. 1 fixes the elevating joint pin, and directs the gun towards the mark. Meanwhile, No. 2 kneels and places the ammunition box in position.

No. 2 should time his advance so as to reach the tripod at the moment its adjustment is completed.

When No. 3 sees the gun is nearly mounted, he carries the ammunition box forward and places it within reach of No. 2. The ammunition must be at hand directly No. 2 is ready for it. No. 3 then retires to a position not immediately in rear of the gun.

On the command *Load*, No. 1 at once raises the tangent sight, No. 2 passes the tag of the belt through the feed block. No. 1 turns the crank handle on to the buffer spring, and with his left hand pulls the belt straight through to the left front as far as it will go, and lets go the crank handle; he

releases the strain on the belt, then turns the crank handle on to the buffer spring; he again pulls the belt to the left front and lets go the belt and crank handle. The gun is now loaded and ready to fire. Each motion should be distinct and clean.

On the command (range), *e.g.*, 900, No. 1 repeats the order for his own gun, and adjusts the slide to the elevation required for the distance ordered.

On the command *At*—— (naming the aiming mark), No. 2 adjusts the traversing clamp if told to do so by No. 1, and No. 1 lays the gun, maintaining the same pressure on the handles while laying as he would when firing.

When the gun is laid No. 1 raises the automatic safety catch with the forefinger, and prepares to fire. When No. 1 is ready, No. 2 holds up his hand. As proficiency increases the pause between naming the range and the aiming mark should be slight.

On the command *Fire*, No. 1 presses the double button.

On the command *Cease Fire* No. 1 releases the automatic safety catch, and remains steady.

Traversing Fire.—Frequent instruction will be given in traversing fire. The firer must first ensure that the traversing clamp is just sufficiently loose to enable the gun to be deflected by means of a sharp tap with the hand on the rear cross piece. Each man must learn by experience the exact degree of clamping he requires, and before firing he should ensure that the clamp is correctly adjusted to himself.

Traversing fire is applied by means of a series of groups fired at regular intervals within certain limits indicated by such figures on the target as may be ordered by the instructor.

The target will be the instructional machine gun target.

The procedure for horizontal traversing is as follows:—

The instructor having described the figure between which fire is to be directed, will give the command *Traversing fire*. The firer will

lay the gun on the flank figure named and press the button, then tap the gun approximately to the centre of the interval to the next figure, again press the button, then tap and so on until the limit ordered has been reached. The firer should be taught to fire groups of about eight rounds by maintaining pressure on the button for about one second at each group. By this method he learns to tap the gun with the necessary force in order to avoid firing more than one group at the same place, and also to avoid leaving gaps in the line he is traversing.

As proficiency increases instruction should be given in diagonal traversing. In this case the target will be three bands each with three figures as for horizontal traversing. The bands will be joined so that each of the outer bands is in the same vertical plane as the centre band and forms an angle of 120 degrees with it. In this case the firer is taught to combine the use of the elevating wheel with tapping for deflection. The same principles as for horizontal traversing apply for this diagonal traversing.

Instruction should be afforded in traversing from right to left as well as from left to right.

During the instruction fire should be stopped at least twice in order to check the laying and also to measure the distance traversed. By comparing the distance traversed with the number of groups fired, an estimate can be deduced as to the value of the traversing fire. For example:—Traversing fire is ordered from the 1st to the 6th figure; fire is stopped after the 4th group. If the traverse has been correctly carried out the gun should be laid on the interval between the 2nd and 3rd figures.

On the command *Unload*, No. 1 lowers the tangent sight but not the slide, turns the crank handle twice in succession on to the buffer spring, letting it fly back each time on to the check lever; then presses up the finger pieces on the lower pawls, while No. 2 withdraws and repacks the belt in the box; this must be done correctly and the lid closed and fastened; No. 1 clears the ejector tube and lock, and releases the lock spring by pressing the double button.

On the command *Dismount gun*, No. 1 removes the elevating joint pin, No. 2 replaces the cork plug, passes the ammunition box to No. 3, removes the gun as in mounting, and replaces it in its original position in rear. No. 1 follows with the tripod. On reaching the original position, he sees that the joint pins are home and turned down, and then folds and clamps the legs.

Instruction should be afforded in bringing the gun into action in the several positions of the tripod, and in various natures of ground. Firing up, down, and along the side of steep hills should be practised. Practice should also be afforded in mounting the gun from the prone position, in firing from the lying position, and when kneeling on both knees, as well as when sitting.

BELT FILLING.

The corporal, all the numbers, and also the drivers of the limbered wagon and S.A.A. cart when available, should be instructed and frequently practised in belt filling, both by hand and with the belt filling machine.

DRILL WITH LIMBERED WAGONS.

The detachment will be formed up in two ranks six paces from the rear of the wagon, facing outwards.

On the command or signal *Action*, the driver dismounts and stands to his horses. The sergeant and Nos. 5 and 6 double out to the section officer. The corporal lowers the tail board and superintends the unpacking. The remaining numbers ground arms on the word of command of the senior number and fall out to the wagon to perform the duties detailed on pages 86-89.

The corporal selects a suitable covered position for the limbered wagon, if necessary.

On the command or signal *Dismount guns*, the procedure for unpacking is reversed and when completed detachments fall in and take up arms by word of command.

DRILL WITH PACK TRANSPORT.

Normally mules will be led by Nos. 1, 2, 3, 4, 7, and 8. On the command *Prepare for action*, Nos. 2, 3, 7, and 8 will link their

mules to those immediately in front of them. Nos. 7 and 8 will lead Nos. 1 and 4 mules. Nos. 1 and 2 will march on the tripod and gun sides respectively of No. 1 mule and loosen straps. Nos. 3 and 4 will march on either side of No. 2 mule.

On the command or signal *Action*, No. 1 will off-load the tripod and No. 2 the gun, No. 3 will off-load the leading ammunition animal. The corporal will select a suitable covered position for the pack animals. The other duties of the various numbers are as on pages 86-89.

On the command or signal *Stand to*, Nos. 1, 2, and 3 will reverse the actions of off-loading. The detachment will then form up for marching.

TESTS OF ELE-

M.R., Part I.,

The Superintending Officer will initial the space below the test down in para. 642 must

[illegible]

MENTARY TRAINING.

para. 642.

against each man's name when satisfied. The conditions laid
be strictly complied with.

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